high-resolution ultrasound machine screen and enhanced contrast, the block performers stopped injecting when a hypo-echoic volume was seen clearly on the screen. We also compared needle penetration with the needle tip position in, or outside of, the nerve.

Histologically, the risk of ink contamination from one site to another clearly exists and was observed outside the epineurium. Our pathologists made multiple sections of the nerve and could not observe any sub-epineurial contamination. We used fresh cadavers and this could be different with embalmed specimens.

Our study does not suggest that targeting the nerve tangentially, and rolling the nerve as the needle passes above or below its ill-defined border is preferable to slowly skewering it. Instead, our study suggests that it is preferable to approach the nerve at its lower/upper border (tangential) and to stop advancing the needle when this border is reached. However, if an accidental advancement ‘beyond the border’ occurs, the risk of nerve penetration and sub-epineurial injection is lower than using a direct approach. As such, we agree with Szerb and Kwesi Kwofe that the border of the nerve should be avoided in all procedures. Szerb et al.’s study and ours complement each other in improving the safety of interscalene blocks.

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Is the erector spinae plane (ESP) block a sheath block?

We commend Chin et al. for important work on the use of
block will be successful by distribution of the LA not only cranially and caudally along the sheath, but by subsequently gaining access to the paravertebral space via apertures existing in the anterior sheath wall that act as conduits for injected LA. In our experience to date, such longitudinal spread of LA within the sheath is the end-point for a successful injection. Any injection deeper to the anterior sheath wall does not permit spread of LA beyond one intertransverse space, due to tethering of the sheath to the transverse processes.

We propose the LA spreads within the sheath by this mechanism, blocking the dorsal and ventral rami of thoracic spinal nerves at multiple vertebral levels. This explains why a successful block has been achieved by depositing LA both superficial and deep to the erector spinae muscle [5], as long as the LA is deposited within the erector sheath compartment between the erector spinae muscle and its investing sheath. However, the evidence suggests that targeting the sheath deep to the erector spinae muscle is most effective [1, 2, 5].

The contrast study performed by Chin et al. clearly demonstrates the spread of dye injectate medially and on both surfaces of the erector spinae muscles in the cadaver, which further confirms the anatomical basis of this sheath block. To underscore the importance of depositing the LA within these anatomical boundaries, we suggest the ESP block be renamed the erector sheath block (ESB), akin to rectus sheath block in the anterior abdominal wall.

Further anatomical and clinical investigation is necessary to elucidate the detailed mechanism and clinical applications of the ESB [6].

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Is the erector spinae plane (ESP) block a sheath block? A reply

We thank Drs Hamilton and Manickam for their insightful comments on the erector spinae plane (ESP) block and share many of their opinions. Willard et al.’s paper [1] is, in our opinion, required reading for anyone wishing to obtain a deeper understanding of the anatomical basis for not only the ESP block but also the various iterations of the quadratus lumborum (QL) block. Radiological imaging in cadavers and live patients [2, 3] confirms that injectate spreads extensively in the fascial sheath around the erector spinae muscle (ESM). It is also quite possible that this spread in the ESM fascial sheath is the mechanism by which the posterior QL (or QL2) block exerts its action, i.e. it is effectively an ESP block performed at the L3–4 level and with a more lateral injection point. Notwithstanding this, we believe it makes more sense to perform an ESP block and inject at a vertebral level congruent to the abdominal surgical incision, rather than relying on adequate cephalad spread to the thoracic spinal nerves that supply the abdomen. By injecting closer to the neuraxial mid-line, and the paravertebral space, there is also an increased likelihood that the local anesthetic will penetrate to the paravertebral space and result in visceral analgesia [4].

Drs Hamilton and Manickam’s observation that the optimal plane for injection may be within this hyperechoic investing sheath, rather than deep to it, is an interesting one. We would emphasise though that intramuscular injection should be avoided, and that the hyperechoic fascial layer observed between the ESM and the transverse processes/intercostal muscles is a complex multi-laminar structure. We
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